

WHAT IS CLAIMED IS:

1. An image information conversion apparatus which receives first image compression information as an input thereto and outputs second image compression information, each of the first image compression information and the second image compression information including at least intra-image coded pictures and inter-image prediction coded pictures, comprising:

quantization scale determination means for using information extracted from the first image compression information to determine an initial value for a reference quantization scale to be used for production of an intra-image coded picture of the second image compression information and determining an initial value for a virtual buffer occupation amount for an intra-image coded picture based on the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

2. An image information conversion apparatus according to claim 1, wherein the information extracted from the first image compression information is an average quantization scale of the first intra-image coded picture of the first image compression information.

3. An image information conversion apparatus according to claim 2, wherein the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information is determined by operation of the product of a ratio of a code amount of the first image compression information to a code amount of the second image compression information, a ratio of a frame rate of the second image compression information to a frame rate of the first image compression information, and the average quantization scale of the first intra-image coded picture of the first image compression information.

4. An image information conversion apparatus according to claim 3, wherein an integer nearest to the value obtained by the arithmetic operation from among integers representative of the quantization scale used for coding of the second image compression information is used as the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

5. An image information conversion apparatus according to claim 3, wherein the initial value for the virtual buffer occupation amount for the intra-image coded picture is determined based on a ratio of the

product of the initial value for the reference quantization scale and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate.

6. An image information conversion apparatus according to claim 5, wherein the inter-image prediction coded pictures include a forward prediction coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward prediction coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the intra-image coded picture and a first constant whereas the initial value for the virtual buffer occupation amount for the bi-directionally predicted coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the forward prediction coded picture and a second constant.

7. An image information conversion apparatus according to claim 2, wherein the initial value for the reference quantization scale for the first intra-image coded picture of the second image compression information is determined by operation of the product of a ratio of

the code amount allocated to the first intra-image coded picture of the first image compression information to a target code amount for the first intra-image coded picture of the second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined coding units included in one frame of the first image compression information, and an average quantization scale of the first intra-image coded pictures of the first image compression information.

8. An image information conversion apparatus according to claim 7, wherein an integer nearest to the value obtained by the arithmetic operation from among integers representative of the quantization scale used for coding of the second image compression information is used as the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

9. An image information conversion apparatus according to claim 7, wherein the initial value for the virtual buffer occupation amount for the intra-image coded picture is determined based on a ratio of the product of the initial value for the reference

quantization scale and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate.

10. An image information conversion apparatus according to claim 9, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the intra-image coded picture and a first constant whereas the initial value for the virtual buffer occupation amount for the bi-directionally predicted coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the forward predictive coded picture and a second constant.

11. An image information conversion apparatus according to claim 3, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the reference quantization scale to be used for production of the first forward predictive coded

picture of the second image compression information is determined by operation of the product of a ratio of the code amount of the first image compression information to the code amount of the second image compression information, a ratio of the frame rate of the second image compression information to the frame rate of the first image compression information, and an average quantization scale of the first inter-image predictive coded picture of the second image compression information, whereafter the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount of the first image compression information to the code amount of the second image compression information, a ratio of the frame rate of the second image compression information to the frame rate of the first image compression information, and an average quantization scale of the first bi-directionally predicted coded picture of the second image compression information.

12. An image information conversion apparatus according to claim 11, wherein the inter-image predictive coded pictures include a forward predictive coded picture

and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first inter-image predictive coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate, whereafter the initial value for the virtual buffer occupation amount for the bi-directionally predicted coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to the variable based on the ratio between the bit rate and the display rate.

13. An image information conversion apparatus according to claim 3, wherein the inter-image predictive coded pictures include a forward predictive coded picture

and a bi-directionally predicted coded picture, and the initial value for the reference quantization scale to be used for production of the first forward predictive coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount allocated to the first inter-image predictive coded picture of the first image compression information to a target code amount for the first inter-image predictive coded picture of the second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined coding units included in one frame of the first image compression information, and an average quantization scale of the forward predictive coded picture of the first image compression information, whereafter the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount allocated to the first bi-directionally predicted coded picture of the first image compression information to a target code amount for the first bi-directionally predicted coded picture of the



second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined coding units included in one frame of the first image compression information, and an average quantization scale of the bi-directionally predicted coded picture.

14. An image information conversion apparatus according to claim 13, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first inter-image predictive coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate, whereafter the initial value for the virtual buffer occupation amount for a bi-directionally predicted coded picture is determined based on a ratio of the product of the initial

value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to the variable based on the ratio between the bit rate and the display rate.

15. An image information conversion apparatus according to claim 1, wherein the first image compression information is MPEG2 image compression information standardized by the Moving Picture Experts Group, and the second image compression information is MPEG4 image compression information.

16. An image information conversion method for receiving first image compression information as an input thereto and outputting second image compression information, each of the first image compression information and the second image compression information including at least intra-image coded pictures and inter-image predictive coded pictures, said method comprising the steps of:

using information extracted from the first image compression information to determine an initial value for a reference quantization scale to be used for production

of an intra-image coded picture of the second image compression information; and

determining an initial value for a virtual buffer occupation amount for an intra-image coded picture based on the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

17. An image information conversion method according to claim 16, wherein the information extracted from the first image compression information is an average quantization scale of the first intra-image coded picture of the first image compression information.

18. An image information conversion method according to claim 17, wherein the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information is determined by operation of the product of a ratio of a code amount of the first image compression information to a code amount of the second image compression information, a ratio of a frame rate of the second image compression information to a frame rate of the first image compression information, and the average quantization scale of the first intra-image coded picture of the first image compression information.

19. An image information conversion method according to claim 18, wherein an integer nearest to the value obtained by the arithmetic operation from among integers representative of the quantization scale used for coding of the second image compression information is used as the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

20. An image information conversion method according to claim 18, wherein the initial value for the virtual buffer occupation amount for an intra-image coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate.

21. An image information conversion method according to claim 20, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined by operation of the product of the initial value for the

virtual buffer occupation amount for an intra-image coded picture and a first constant whereas the initial value for the virtual buffer occupation amount for a bi-directionally predicted coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the forward predictive coded picture and a second constant.

22. An image information conversion method according to claim 17, wherein the initial value for the reference quantization scale for the first intra-image coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount allocated to the first intra-image coded picture of the first image compression information to a target code amount for the first intra-image coded picture of the second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined coding units included in one frame of the first image compression information, and an average quantization scale of the first intra-image coded pictures of the first image compression information.

23. An image information conversion method

according to claim 22, wherein an integer nearest to the value obtained by the arithmetic operation from among integers representative of the quantization scale used for coding of the second image compression information is used as the initial value for the reference quantization scale to be used for production of the first intra-image coded picture of the second image compression information.

24. An image information conversion method according to claim 22, wherein the initial value for the virtual buffer occupation amount for an intra-image coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate.

25. An image information conversion method according to claim 24, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for an intra-image coded

picture and a first constant whereas the initial value for the virtual buffer occupation amount for the bi-directionally predicted coded picture is determined by operation of the product of the initial value for the virtual buffer occupation amount for the forward predictive coded picture and a second constant.

26. An image information conversion method according to claim 18, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the reference quantization scale to be used for production of the first forward predictive coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount of the first image compression information to the code amount of the second image compression information, a ratio of the frame rate of the second image compression information to the frame rate of the first image compression information, and an average quantization scale of the first inter-image predictive coded picture of the second image compression information, whereafter the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second

image compression information is determined by operation of the product of a ratio of the code amount of the first image compression information to the code amount of the second image compression information, a ratio of the frame rate of the second image compression information to the frame rate of the first image compression information, and an average quantization scale of the first bi-directionally predicted coded picture of the second image compression information.

27. An image information conversion method according to claim 26, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first inter-image predictive coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate, whereafter the initial value for the virtual buffer occupation amount



for a bi-directionally predicted coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to the variable based on the ratio between the bit rate and the display rate.

28. An image information conversion method according to claim 18, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the reference quantization scale to be used for production of the first forward predictive coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount allocated to the first inter-image predictive coded picture of the first image compression information to a target code amount for the first inter-image predictive coded picture of the second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined

coding units included in one frame of the first image compression information, and an average quantization scale of the forward predictive coded picture, whereafter the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information is determined by operation of the product of a ratio of the code amount allocated to the first bi-directionally predicted coded picture of the first image compression information to a target code amount for the first bi-directionally predicted coded picture of the second image compression information, a ratio of the number of predetermined coding units included in one frame of the second image compression information to the number of predetermined coding units included in one frame of the first image compression information, and an average quantization scale of the bi-directionally predicted coded picture.

29. An image information conversion method according to claim 28, wherein the inter-image predictive coded pictures include a forward predictive coded picture and a bi-directionally predicted coded picture, and the initial value for the virtual buffer occupation amount for the forward predictive coded picture is determined

based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first inter-image predictive coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to a variable based on a ratio between a bit rate and a display rate, whereafter the initial value for the virtual buffer occupation amount for the bi-directionally predicted coded picture is determined based on a ratio of the product of the initial value for the reference quantization scale to be used for production of the first bi-directionally predicted coded picture of the second image compression information and the highest value of integers representative of the quantization scale used for coding of the second image compression information to the variable based on the ratio between the bit rate and the display rate.

30. An image information conversion method according to claim 16, wherein the first image compression information is MPEG2 image compression information standardized by the Moving Picture Experts Group, and the second image compression information is MPEG4 image compression information.